

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Office of Engineering and Technology Releases)	ET Docket No. 13-26
and Seeks Comment on Updated OET-69)	
Software)	
)	
Expanding the Economic and Innovation)	
Opportunities of Spectrum Through Incentive)	GN Docket No. 12-268
Auctions)	

COMMENTS OF CTIA – THE WIRELESS ASSOCIATION®

Michael F. Altschul
Senior Vice President and General Counsel

Christopher Guttman-McCabe
Vice President, Regulatory Affairs

Scott K. Bergmann
Assistant Vice President, Regulatory Affairs

Krista L. Witanowski
Assistant Vice President, Regulatory Affairs

CTIA – The Wireless Association®
1400 Sixteenth Street, NW
Suite 600
Washington, DC 20036
(202) 785-0081

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COMMENTS OF CTIA – THE WIRELESS ASSOCIATION®

I. INTRODUCTION AND SUMMARY

CTIA – The Wireless Association® (“CTIA”)¹ respectfully submits these comments in response to the Office of Engineering and Technology (“OET”) Public Notice seeking comment on the release of the updated OET Bulletin No. 69 (“OET-69”) software.² This software provides analysis of coverage and interference of full-service digital and Class A television stations in accordance with OET-69, and will likely be an important tool in the Commission’s broadcast television incentive auction process. CTIA supports the Commission’s efforts to update elements of this software, and notes that the new software offers a variety of improvements over past iterations. The new OET-69 software allows for:

- (1) additional user flexibility;

¹ CTIA – The Wireless Association® is the international organization of the wireless communications industry for both wireless carriers and manufacturers. Membership in the organization includes Commercial Mobile Radio Service (“CMRS”) providers and manufacturers, including cellular, Advanced Wireless Service, 700 MHz, broadband PCS, and ESMR, as well as providers and manufacturers of wireless data services and products.

² *Office of Engineering and Technology Releases and Seeks Comment on Updated OET-69 Software*, Public Notice, DA 13-138 (Feb. 4, 2013) (“Public Notice”).

- (2) faster computations of TV station coverage and interference effects;
- (3) better outputs that can be readily used in other software to analyze the effects of new TV stations on coverage and interference; and
- (4) the use of updated terrain and population databases that permit consistent and more accurate calculations of propagation and population served.

These improvements enhance the Commission's ability to implement the intent and specific directive of the Middle Class Tax Relief and Job Creation Act ("Spectrum Act"),³ which states that the Commission should use "reasonable efforts to preserve, as of the dates of enactment of this Act, the coverage areas and population served" of broadcast television licensees, using the methodology described in OET-69.

CTIA notes that the Commission can and should implement these software updates, and that the Spectrum Act does not limit the Commission's ability to employ updated software. Finally, CTIA notes that the OET-69 software is just one piece of the overall repacking picture, and therefore encourages the Commission to complete its repacking algorithm and provide it to the public for review.

II. CTIA SUPPORTS EFFORTS TO UPDATE THE OET-69 SOFTWARE.

The Commission's *TVStudy* software represents an important development in the broadcast television repacking process. CTIA supports the Commission's efforts to update this software, and believes that it is an essential component of a successful incentive auction. In these comments, CTIA highlights several of the many improvements that the OET-69 software offers over past iterations.

³ Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 125 Stat. 156 (2012) ("Spectrum Act").

A. OET-69 Software Will Likely Be a Critical Component of the Incentive Auction Process.

As CTIA stressed in its comments in the Commission's broadcast television incentive auction proceeding, the repacking process is a highly complicated one that will require careful analysis by the Commission. For all parties to understand accurately the use of the 600 MHz spectrum by incumbent TV broadcasters, OET-69 software is needed to calculate the coverage and interference effects associated with existing TV stations. Indeed, the Spectrum Act dictates that the Commission must utilize OET-69 methodology when reconfiguring the 600 MHz spectrum, and as such this software is an essential aspect of the broadcast incentive auction process.⁴

First, a discussion of the existing OET-69 methodology is needed to best understand precisely what is required of the software to implement this process. OET-69 relies upon a methodology that divides the area within a digital television station's noise-limited coverage contour into approximately rectangular "grid cells." These cells are then aggregated to develop the coverage of the TV station under study and interference from adjacent TV stations by making calculations in accordance with OET-69. In general, software has been used by the Commission, implementing OET-69, to make changes to the DTV Table of Allotments and to determine whether it is possible to engineer additional TV station use into this Table.

Additionally, in the *Incentive Auction NPRM*, the Commission has proposed to use the calculations of a digital television station's noise-limited contour area to depict the coverage area for the station.⁵ The *Incentive Auction NPRM* has also proposed to define the "population

⁴ Spectrum Act at § 6403(b)(2).

⁵ See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, FCC 12-118, GN Dkt. No. 12-268, 27 FCC Rcd 12357 (2012) ("*Incentive Auction NPRM*") at ¶ 99.

served” by television stations as the population within a station’s noise-limited contour where its signal strength is predicted to exceed the noise-limited service level and is not subject to predicted interference from other stations, using the protection ratios specified in OET-69 and the Commission’s rules.⁶ Assuming these FCC proposals are adopted (and there has not been any extensive comment on the record opposing these proposals), it is clear that the implementation of OET-69 software will likely directly impact the determination of TV station coverage and population served as defined in the Spectrum Act.⁷

However, as the Commission has noted and as explained in further detail below, the existing OET-69 software is “based fundamentally on source code and data from the 1990s and earlier” and the intervening years since the previous software update have provided the Commission with valuable information it can use to improve the software.⁸ CTIA agrees with the Commission that by providing interested parties with updated software, it will “provide a means for implementing the OET-69 methodology that ensures consistency in the results obtained by the Commission and interested parties.”⁹ Most importantly, the existing software used to implement OET-69 is not well-suited to enable the FCC to determine the most effective and efficient repacking of existing TV stations. The creation of a more updated and consistent software program to implement OET-69 will allow the Commission the ability to input the results into the overarching algorithm to be used as part of the incentive auction and repacking

⁶ *Id.* at ¶ 94.

⁷ Spectrum Act at §§ 6402, 6403.

⁸ Public Notice at 1 (“In addition, parties have gained sufficient experience to have offered FCC staff informal feedback on the existing programs’ relative strengths and weaknesses.”).

⁹ *Id.* at 2.

process. As discussed in detail below, it would be inappropriate, given the mandates of the Spectrum Act, for the Commission to refrain from updating nearly twenty year old software.

B. The New OET-69 Software Offers a Variety of Improvements Over Past Iterations.

As the OET explains in the Public Notice, “an important objective is that we use software with improved accuracy and that makes use of the best available data to compute estimates of the coverage area and population served of each broadcast television licensee consistent with the provisions of the Spectrum Act.”¹⁰ Indeed, this software offers a variety of improvements over past iterations, and CTIA believes that these improvements will enable the Commission to conduct a more precise and informed repacking process and one that more closely tracks the intent and directive of the Spectrum Act.

As an initial matter, the new software will allow for a better user experience and more robust participation by all interested parties. Specifically, the updated OET-69 software contains a graphical user interface based on Java, as well as an analysis engine in C (and FORTRAN) that makes the necessary calculations to establish coverage and interference.¹¹ This allows for a better user experience in the front-end because there is a graphical user interface to enter parameters, and it also results in more useful outputs. For example, shape files are generated that can be placed into a mapping program to see precisely the contours of a station and the interference effects from other stations.

The OET-69 software was originally designed to aid in the transition from analog to digital television service in the late 1990s.¹² The original software was based on FORTRAN

¹⁰ *Id.* at 3.

¹¹ *Id.* at 3.

¹² *Id.* at 1.

code that, while very flexible in allowing users to modify parameters, is not particularly user-friendly nor is it as fast as it could be using current technology.

Further, the original software relied upon data from the 1990 Census, as well as on less precise terrain data (three-arcsecond as opposed to one-arcsecond).¹³ The updated software, conversely, provides more timely and accurate population data (from the 2010 Census) and a one-arcsecond database that better matches the actual operating environment associated with broadcast television. The Public Notice also noted that some data was inaccurately represented and that some calculations in the existing software were not correctly made.

In the Public Notice, the FCC has sought comment on the following parameters associated with the proposed *TVStudy* software: (1) population data; (2) terrain data; (3) treatment of inaccurate data in the FCC database; (4) treatment of antenna beam tilt; (5) calculation of depression angles; (6) level of precision of geographic coordinates; (7) establishment of calculation (cell) grid; and, (8) treatment of internal (Longley-Rice) warnings.¹⁴ CTIA believes the Commission should have the flexibility to adopt its proposed changes to the software implementing the OET-69 methodology that result in consistency (*e.g.*, changes to treatment of inaccurate data, beam tilt and the level of precision) and supports the creation of a global cell calculation grid as needed for making appropriate repacking algorithm decisions in a fast, effective manner. CTIA herein provides specific comment on the other three software changes concerning use of updated population and terrain data as well as the handling of internal (Longley-Rice) warnings.

¹³ CTIA would note that the existing software can and does use 2000 Census data as well, but was originally designed with the 1990 Census data being used for population determinations.

¹⁴ Public Notice at 3.

Population Data. The population database modifications represent crucial upgrades to the OET-69 software. Population changes from 1990 to 2010 are extensive. As the FCC itself noted,¹⁵ the population of the United States has increased by about 24 percent between 1990 and 2010, and the distribution of population has also changed. Given that the FCC has proposed to use the *TVStudy* software to determine the “population served” by TV stations in accordance with the Spectrum Act, it should use the most recent U.S. Census data to make these calculations. Moreover, the Commission has provided the population database it is using internally, so that all affected stakeholders have the ability to use precisely the same population data. This will lead to consistent population calculations to the benefit of all parties attempting to analyze the effects on population served according to the OET-69 methodology.

Terrain Data. With respect to terrain, the Commission has proposed to use more granular digital terrain data as compared to the past software. Previously, the Commission’s software relied upon three-arcsecond digital terrain data, which resulted in land elevations being reported every three seconds of geographic latitude and longitude (about every 300 feet).¹⁶ The Commission has proposed to use one-arcsecond data (elevation points are spaced about every 100 feet) that has much greater resolution than the previous three-arcsecond data.¹⁷ This will allow for a more accurate calculation of the effect of terrain on propagation of broadcast television signals. Further, as the OET notes, the three-arcsecond terrain database is no longer being revised, maintained, or supported by the U.S. Geological Survey.¹⁸ CTIA agrees that

¹⁵ Public Notice at 3.

¹⁶ *Id.* at 4.

¹⁷ *Id.*

¹⁸ *Id.*

“continued use of an unsupported terrain database is likely to lead to obsolescence and potentially inaccurate results,” and therefore supports the proposal to use one-arcsecond data. Finally, the Commission has provided for users the actual digital terrain database it is using as part of the *TVStudy* software – again leading to consistent results for all parties that utilize the software.

“Flagged” Data. Finally, the FCC has proposed to modify the treatment of certain coverage findings that were previously judged by the Commission as being unreliable.¹⁹ Specifically, OET-69 uses the Longley-Rice model to estimate coverage and interference for TV stations. However, due to some anomalies in the model, some of the signal strength numbers associated with the model were deemed dubious or unreliable. The former OET-69 software completely ignored the actual coverage values calculated where they were deemed unreliable, and simply assumed that all these areas were covered by suitable signal levels regardless of the calculations found in the model. In other words, the former OET-69 software reported more coverage for TV stations than was actually available to viewers.

The Commission has sought comment on whether it should continue its past practice of simply assuming coverage where “flagged” cells are found or update its process to take into account the actual signal strength predictions made by the *TVStudy* software. The Commission notes that it utilized the actual signal strength values when it implemented OET-72 and OET-73.²⁰ This in turn allowed the Commission to more accurately predict real-world coverage for TV stations. Thus, the OET’s proposal for implementing OET-69 is similar to that used in

¹⁹ *Id.* at 5-6.

²⁰ *Id.*

implementing OET-72 and OET-73 and would help ensure that coverage for TV stations is consistently and accurately calculated by all of the Commission's engineering tools.

CTIA believes, based on past precedent (implementation of OET-72 and OET-73) and the need for consistent and accurate prediction of real-world coverage and population served in accordance with the dictates of the Spectrum Act, that the Commission should have the flexibility to update its *TVStudy* software. In particular, the predicted signal strengths in the proposed updated software appear to provide a more accurate rendering of the actual TV station service provided. The Spectrum Act requires the Commission to rely on the OET-69 methodology –

“The Spectrum Act requires the Commission to rely on the OET-69 methodology – which the modified software clearly does more accurately and appropriately than the past software implementation did.”

which the modified software clearly does more accurately and appropriately than the past software implementation did. Simply ignoring predictive results and overestimating TV station coverage is not in the public interest and will hamstring the Commission's ability to efficiently and effectively manage the repacking process and to give effect to the incentive auction provisions of the Spectrum Act. CTIA therefore supports updating the *TVStudy* software to take into account the actual signal strength predictions of OET-69.

C. Modifications To The OET-69 Software Will Result In A More Accurate Rendering Of TV Station Coverage.

In this section, CTIA provides a handful of examples, using the new *TVStudy* software, to demonstrate the effectiveness of the Commission's proposed implementation.²¹ In these

²¹ By comparison, CTIA notes that NAB's criticisms of the updated software fail to provide meaningful examples. *See* Letter from Rick Kaplan, NAB to Marlene H. Dortch, FCC, GN Docket No. 12-268, (Feb. 8, 2013) (“NAB Letter”).

examples, CTIA selected three TV stations, one each in Boston, Chicago and Washington, DC, to examine the effects on predicted coverage and population served by accurately implementing OET-69 and, in particular, by not ignoring the signal strength calculations for “flagged” cells.²² For these three cases, the effect on coverage ranged from 0.3 to 5.6% of the market area, and the effect on population served ranged between 0.1 and 1.5%.²³

1. Boston Example.

In Boston, CTIA selected TV station call sign WGBH-TV to model. Below is the coverage map created using *TVStudy* for this station, but where coverage is assumed in all cell grids that have flagged results:

²² In other words, both of the scenarios in these examples rely on 2010 census data, updated terrain data, and other improvements proposed by the FCC. The key and only difference between the scenarios is the use of actual signal strength calculations for flagged cells.

²³ CTIA notes that, while these changes more accurately depict what TV stations are actually covering, the overall effect is *de minimis*.

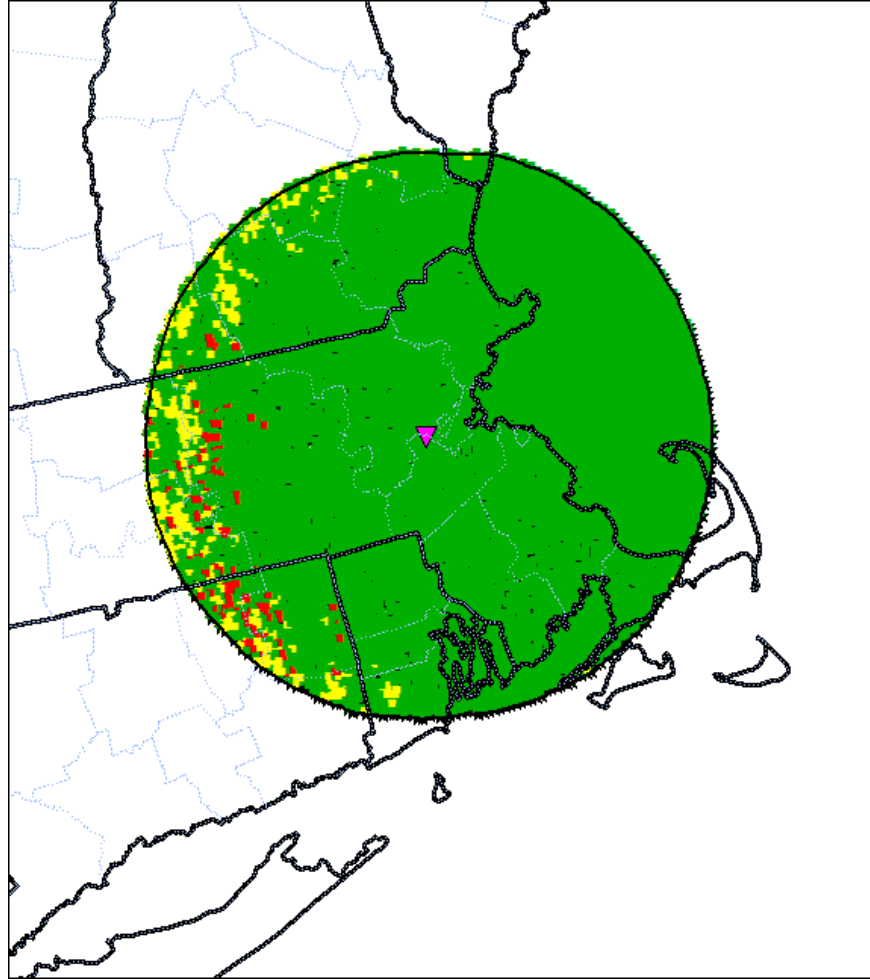


Figure 1: Boston WGBH Assumed Coverage

The dark green area depicts coverage; the yellow areas show no coverage due to terrain shielding and the red areas show no coverage due to interference from other TV stations. Thus, under the assumptions for flagged cells used in the past OET-69 software, 32,345 square kilometers of area are shown as interference free coverage, and the population served is 7,586,562 people.

Next, CTIA ran *TVStudy* to look at the same Boston TV station, but more accurately used the actual signal strength levels predicted by OET-69 to show coverage and population served:

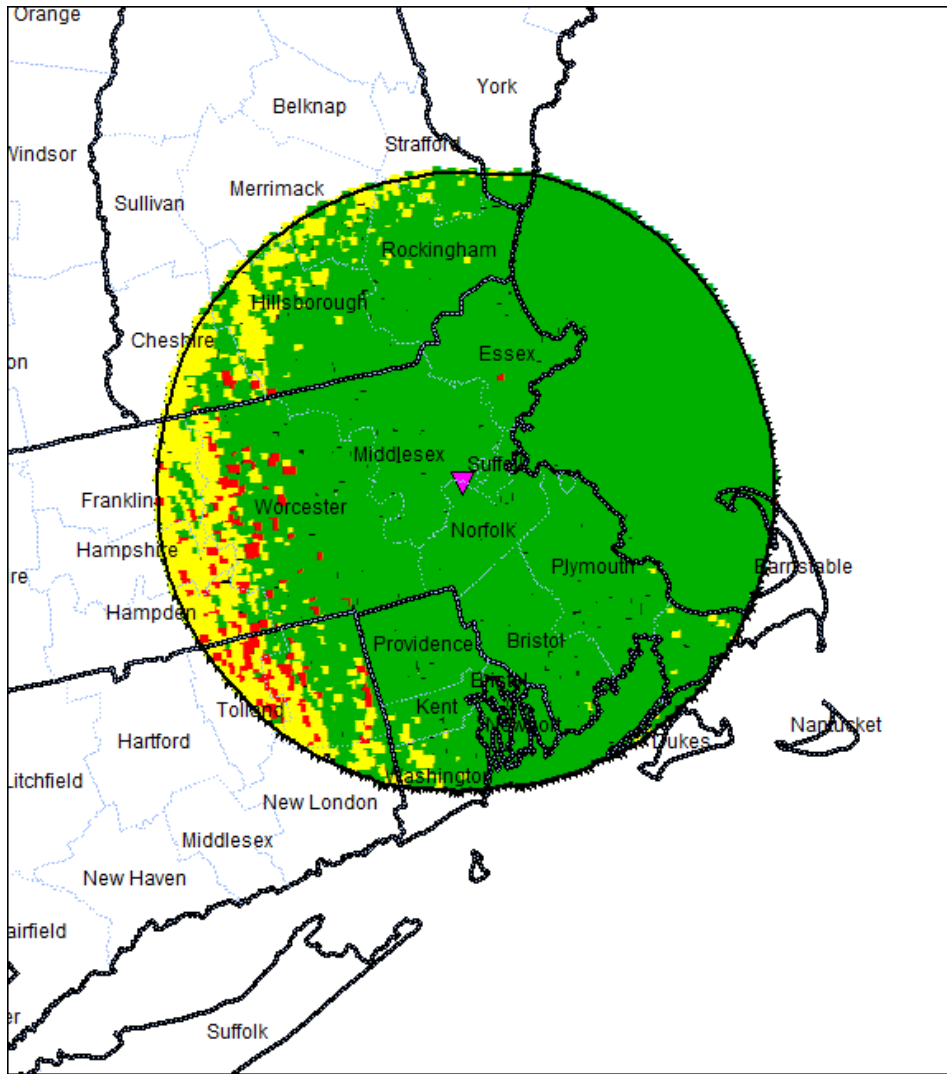


Figure 2: Boston WGBH Predicted Coverage

Under this more accurate set of assumptions, the yellow areas (showing terrain blocked coverage) have increased, as have the red areas (showing TV station interference). While this more accurate depiction of TV station coverage is less than the prior figure, it more accurately represents the effects of signal blockage due to terrain as well as interference felt from adjacent TV stations and, thus, the coverage area and population served. However, the overall effect is a loss of 1,913 square kilometers in coverage area (a reduction in geographic area of 5.6%) and a reduction in population served of 117,949 people (or a reduction of 1.5%).

2. Chicago Example.

In Chicago, CTIA selected TV station call sign WGN-TV to model. Below is the coverage map created using *TVStudy* for this station, where coverage is assumed in all cell grids that have flagged results:

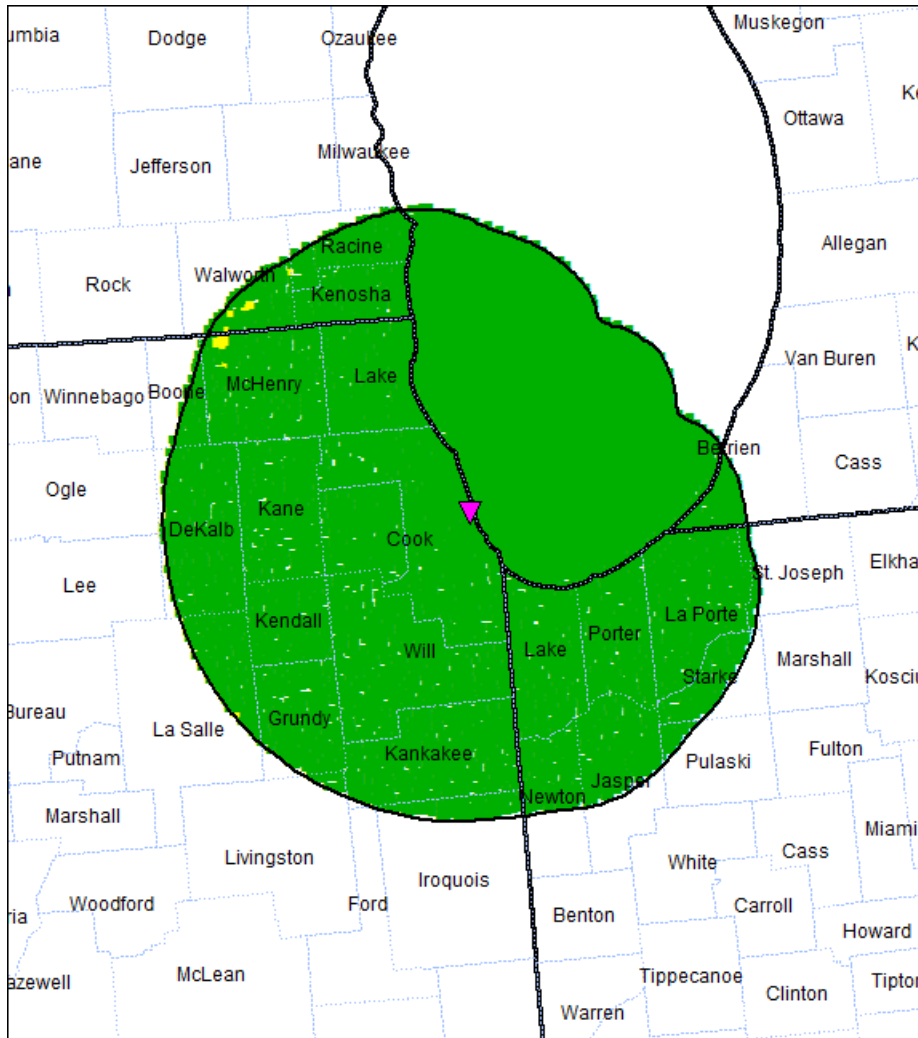


Figure 3: Chicago WGN Assumed Coverage

The dark green area depicts coverage; the yellow areas show no coverage due to terrain shielding. Thus, under the assumptions for flagged cells used in the past OET-69 software, 32,990 square kilometers of area are shown as interference free coverage, and the population

served is 9,941,062 people. Next, CTIA ran *TVStudy* to look at the same Chicago TV station, but more accurately used the actual signal strength levels predicted by OET-69 to show coverage and population served:

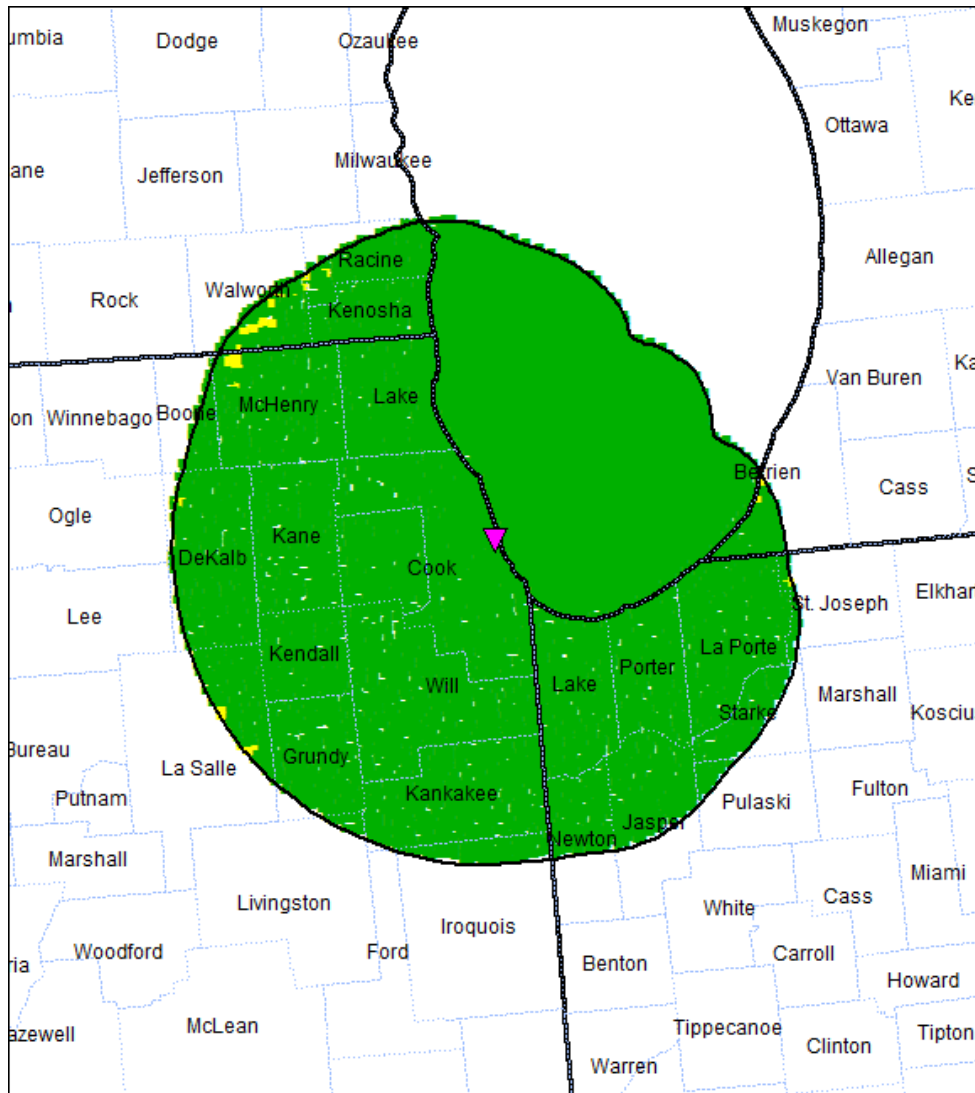


Figure 4: Chicago WGN Predicted Coverage

Unlike Boston, there is very little difference in terrain shielding for the Chicago market. The overall difference between the former software and the new software is a loss of 89 square

kilometers in coverage area (a reduction in geographic area of 0.3%) and only a reduction in population served of 4991 people (or a reduction of less than 0.1%).

3. Washington DC Example.

Finally, CTIA ran the *TVStudy* software to analyze station WRC covering the DC market. The first map for WRC, where coverage is assumed in all cell grids that have flagged results, is:

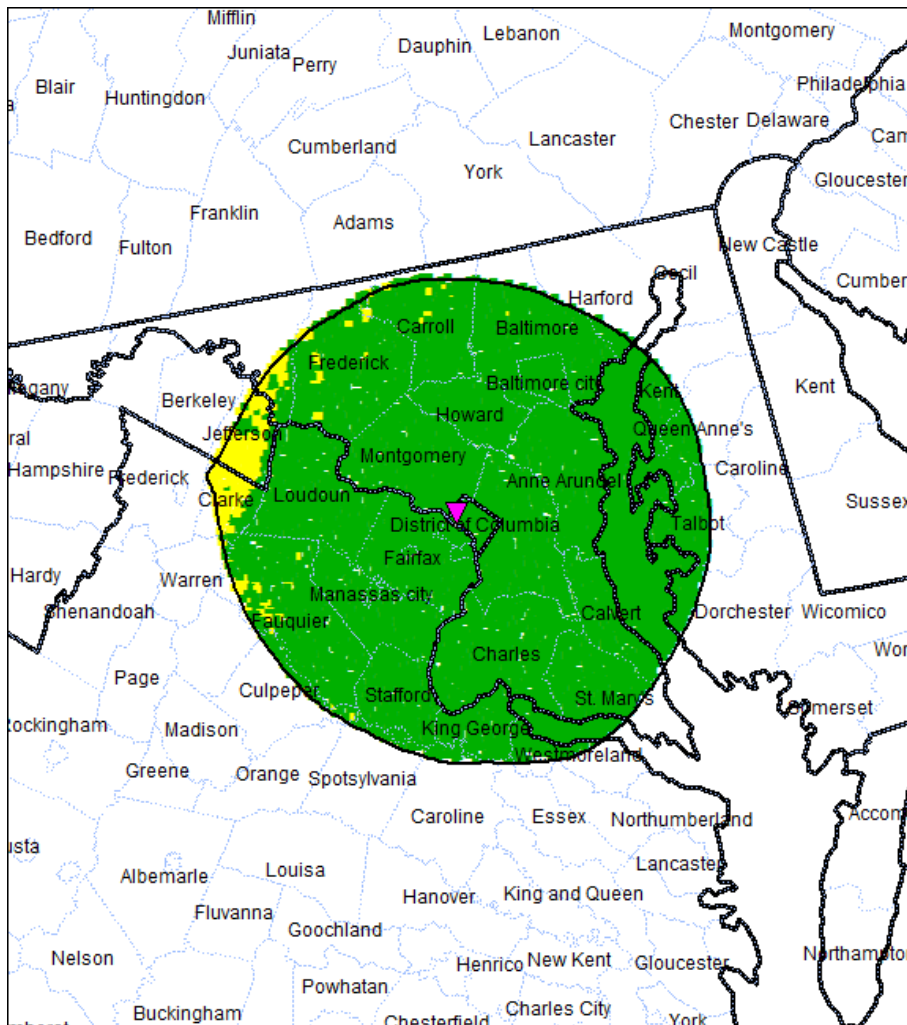


Figure 5: Washington DC WRC Assumed Coverage

As before, the dark green area depicts coverage; the yellow areas show no coverage due to terrain shielding. Thus, under the assumptions for flagged cells used in the past OET-69

software, 22,310 square kilometers of area are shown as interference free coverage, and the population served is 7,958,294 people.

Next, CTIA ran *TVStudy* to look at the same DC TV station, but more accurately used the actual signal strength levels predicted by OET-69 to show coverage and population served:

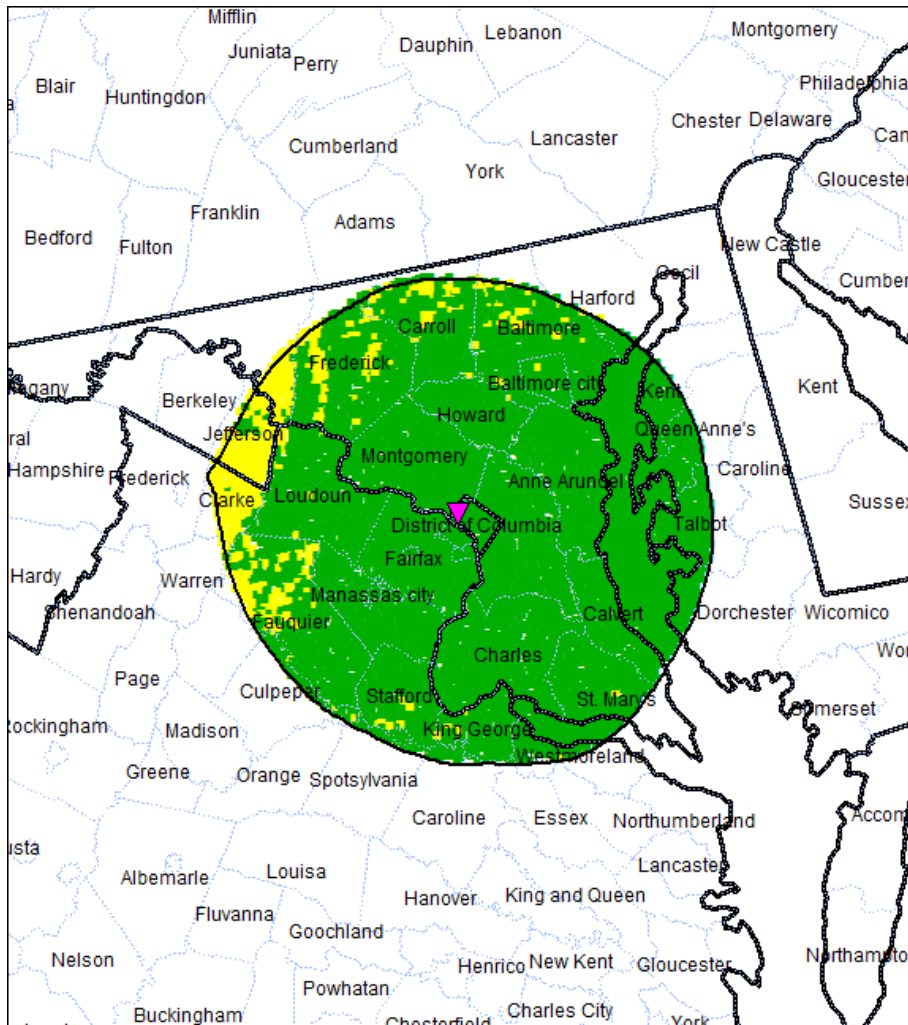


Figure 6: Washington DC WRC Predicted Coverage

Again, there are some measured differences for the Washington DC station due to terrain shielding. The overall difference between the assumptions used in the former software and the

new software is a loss of 1044 square kilometers in coverage area (a reduction in geographic area of 4.5%) and a reduction in population served of 76,408 people (or a reduction of about 1%).

From reviewing these three examples, it is clear that a key difference in coverage shown by the past version of the software as compared to *TVStudy* is primarily due to terrain shielding effects. The former version of the software simply ignored effects from terrain in those cases where the results from the software were deemed “dubious” rather than giving full consideration to the effects that terrain would have on shielding TV viewers from receiving suitable signal strength for reception. As such, CTIA would argue that the new formulation of the software that implements OET-69 does a more credible job in showing real-world, predicted coverage.

III. THE COMMISSION CAN AND SHOULD EMPLOY UPDATED SOFTWARE IN IMPLEMENTING THE SPECTRUM ACT.

In an *ex parte* letter filed with the Commission, the National Association of Broadcasters (“NAB”) asserted that the Spectrum Act precludes the adoption of updated OET-69 software, and that the Commission may only apply OET-69 as it existed at the time of the Spectrum Act’s amendment.²⁴ But NAB has fundamentally mistaken a tool implementing the methodology with the methodology itself. In other words, OET-69 prescribes a procedure for calculating television signal coverage, and as the OET notes in the Public Notice, *it has not proposed to change OET-69*.

Rather, the OET proposes to modify the software used by the industry to better report results in accordance with OET-69, and there are good reasons to do so, since the new software “operates on modern computer systems, [] runs much faster, provides greater accuracy in

²⁴ NAB Letter at 2.

modeling and analysis, and is easier to use and more versatile than the existing software.”²⁵ As the Public Notice explains, OET-69 does not specify all of the parameters and methods required when developing software to implement OET-69, but provides the Commission with wide discretion in developing software that could ultimately produce more accurate results than that used currently.²⁶

Against this backdrop, NAB’s legal challenges are clearly misdirected. NAB alleges that the Public Notice proposes changes, such as the issue of how “flagged” cells in Longley-Rice are addressed, that would essentially change OET-69.²⁷ Further, NAB would have the Commission completely divorce the improvements to OET-69 software from the incentive auction process, even if the Commission took no action that in NAB’s view—“altered the methodology” of OET-69.²⁸

As discussed below, the new *TVStudy* software is a rational, necessary modernization of the automated implementation of OET-69, not a modification of OET-69 itself. Indeed, all the Commission has sought to do in creating the *TVStudy* software is to provide a consistent and accurate software package that predicts the coverage and interference effects associated with TV station operations *in accordance with* OET-69. These improvements are obvious – use of 2010 Census data is a much more accurate representation of the current population than is 1990

²⁵ Public Notice at 1.

²⁶ *Id.* at 2.

²⁷ NAB Letter at 3.

²⁸ *Id.* at 4 (“NAB believes strongly, however, that such a review must take place apart from the incentive auction process. . . . [t]his proceeding is not an appropriate forum because, beyond speeding up the processing of the nationwide repack – which can be done through other means – the package of changes contemplated are highly unlikely to yield any appreciable benefit for stakeholders in the auction.”).

Census data; more granular terrain data better describes the effects of terrain on propagation. Further, the other proposed changes to consistently treat inaccurate FCC data, antenna beam tilt, antenna depression angle and geographic coordinates in some cases are to the benefit of broadcaster coverage. Finally, and most crucially, CTIA believes that reliance on predictions made by the OET-69 methodology, rather than simply ignoring relevant data, is a much improved approach for implementation of the OET-69 software. The Commission has found this to be the case when implementing OET Bulletins 72 and 73 and should do so here as well. The Spectrum Act mandates that the Commission rely upon OET-69 methodology for determining TV broadcaster coverage and population served. Ignoring signal strength predictions from OET-69 would completely ignore the statutory requirements placed upon the Commission.

The implementation of software that predicts signal strength, interference effects and coverage based on OET-69 methodology is clearly an area that is (and should) be left to the Commission's discretion to determine under the *Chevron* doctrine.²⁹ In this instance, Section 6403(b)(2) of the Spectrum Act states that: "...the Commission shall make all reasonable efforts to preserve, as of the date of the enactment of this Act, the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin 69 of the Office of Engineering and Technology of the Commission."³⁰ Nothing in the *TVStudy* software proposals turns away from usage of the OET-69 methodology. All the Commission seeks to do is update its existing software to faithfully implement OET-69 so that it is more accurate, consistent and efficient in implementation. As such, the Commission is well within its authority to make the software changes it has proposed.

²⁹ Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984) ("*Chevron*").

³⁰ Spectrum Act at § 6403(b)(2).

Further, in past instances where Congress has directed the Commission to use a particular technological model, courts have granted the Commission considerable deference in determining whether the model is proper and whether changes need to be made to it. For example, the Satellite Home Viewer Improvement Act of 1999 (“SHVIA”) directed the Commission to “develop and prescribe by rule a point-to-point predictive model for reliably and presumptively determining the ability of individual locations to receive signals [of grade B intensity].”³¹ The Commission adjusted its Longley-Rice model for UHF stations but left the VHF calculations essentially unchanged.³² The D.C. Circuit upheld the Commission’s decision, finding that it acted properly because the Commission’s chosen methodology increased the accuracy of the model.³³

As OET indicates in the Public Notice, the proposed *TVStudy* software will be more user-friendly than its predecessor and employ more accurate data and calculations. The Commission should reject arguments that seek to suppress these valuable improvements.

IV. THE COMMISSION SHOULD STILL WORK TOWARD PROVIDING THE COMPLETE REPACKING ALGORITHM FOR PUBLIC COMMENT.

While CTIA commends the OET for its work in developing and releasing the OET-69 software and believes that it will be a valuable tool for interested parties to the broadcast television incentive auction, the OET-69 software is only one piece of the repacking puzzle. CTIA urges the Commission to complete its repacking algorithm and provide it to the public for review. This will enable all affected stakeholders the opportunity to understand the methodology used by the Commission while ensuring that the algorithm itself is the most effective and

³¹ *EchoStar Satellite LLC v. FCC*, 457 F.3d 31, 33 (D.C. Cir. 2006).

³² *Id.* at 34-35.

³³ *Id.* at 37.

efficient model to be used for repacking broadcast stations. CTIA looks forward to reviewing and offering comment on the Commission's overall repacking algorithm.

V. CONCLUSION

CTIA believes that the proposed *TVStudy* software holds great promise and will be a valuable tool to stakeholders in the Commission's incentive auction process. CTIA encourages the Commission to adopt software updates that will facilitate stakeholders' ability to evaluate the potential impact of the broadcast television repacking, and asks the Commission to also make available its complete repacking algorithm.

Respectfully submitted,

By: /s/ Krista L. Witanowski

Krista L. Witanowski
Assistant Vice President, Regulatory Affairs

Michael F. Altschul
Senior Vice President, General Counsel

Christopher Guttman-McCabe
Vice President, Regulatory Affairs

Scott K. Bergmann
Assistant Vice President, Regulatory Affairs

CTIA – The Wireless Association®
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